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(54) A reparable tape measure

(57) A tape measure 10 includes a housing 12 having first 14 and second 16 members and an access door 17 which is openable to provide an access port to the interior of the housing. A spool 28 is rotatably mounted upon an axle 44 which has an integrally formed ratchet plate 50. The ratchet plate engages ratchet teeth 54 that are integrally formed within the interior surface of the housing to provide for rotation of the axle to load a spring 36 within the spool to a desired tension. The ratchet teeth normally prevent rotation of the axle to unload the spring tension. An overriding mechanism allows the axle to axially move to disengage the ratchet plate from the ratchet teeth to provide for rotation of the axle to unload the spring mechanism. A lock button 19 has a thumb operating section at the top portion of the housing and has a pressure regulating section which regulates the pressure that the locking tabs of the lock button exerts against the tape.

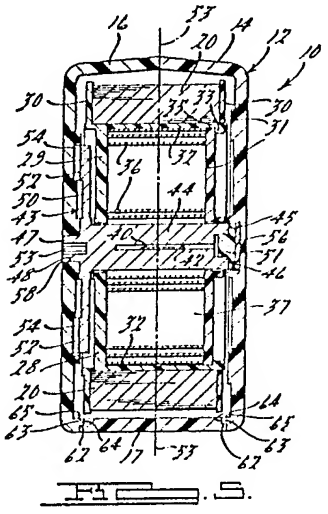

FIG. 5.

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The drawings originally filed were informal and the print here reproduced is taken from a later filed formal copy.

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FIG. 1.

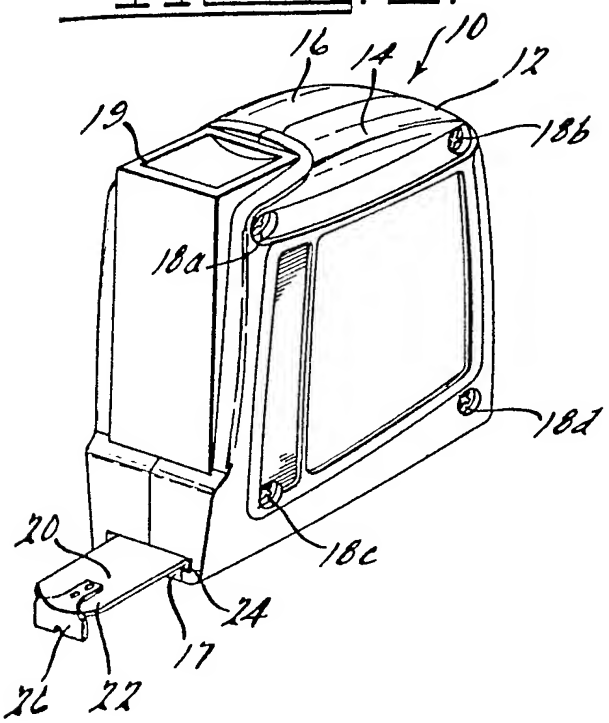
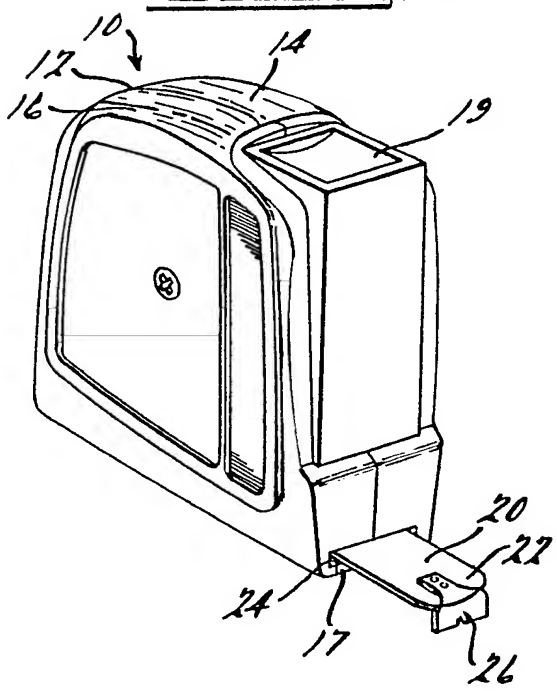


FIG. 2.



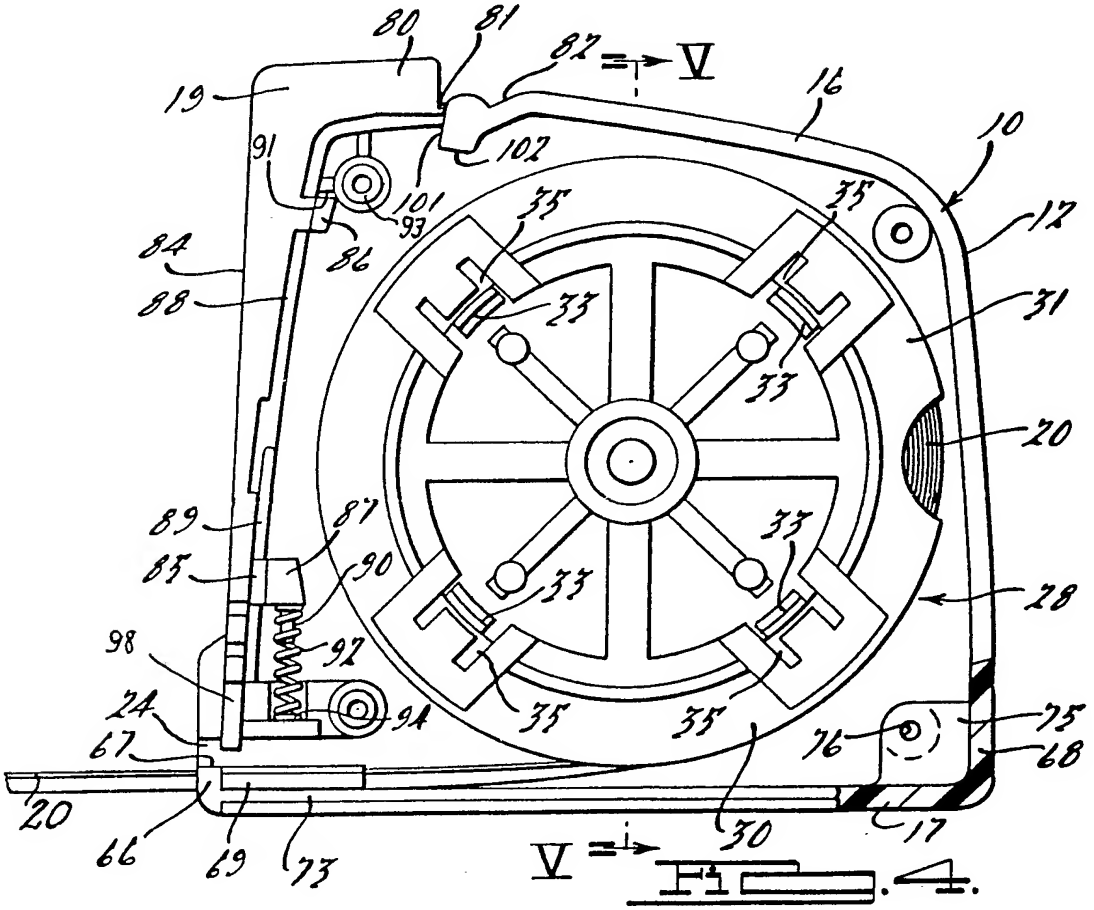


FIG. 4.

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FIG. 3.

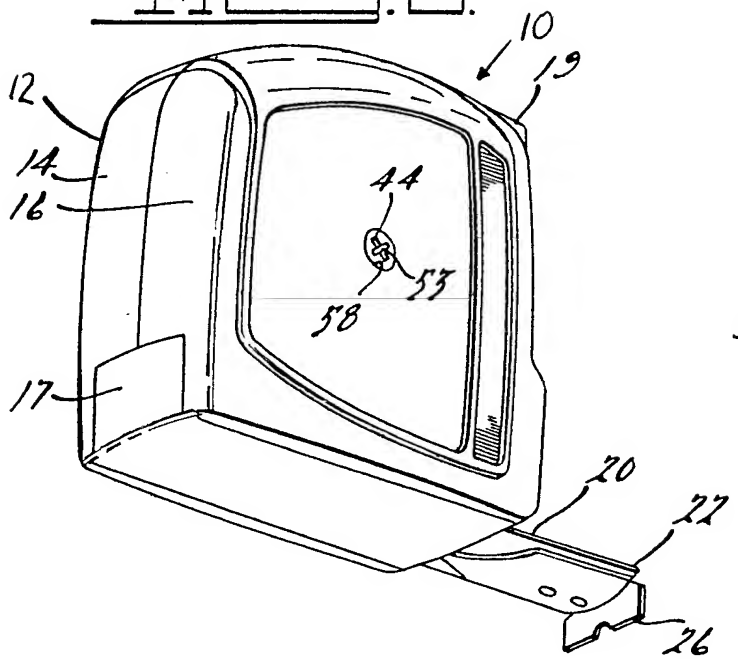


FIG. 11.

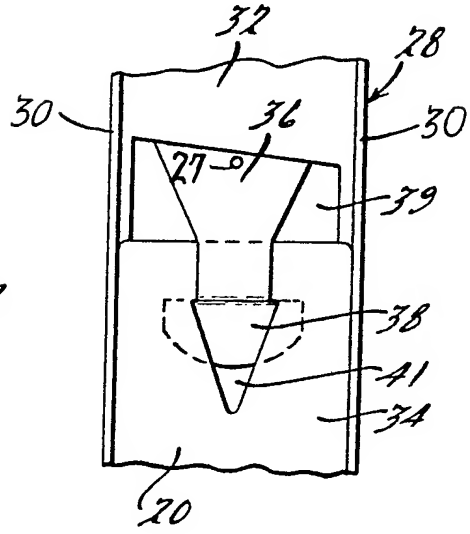
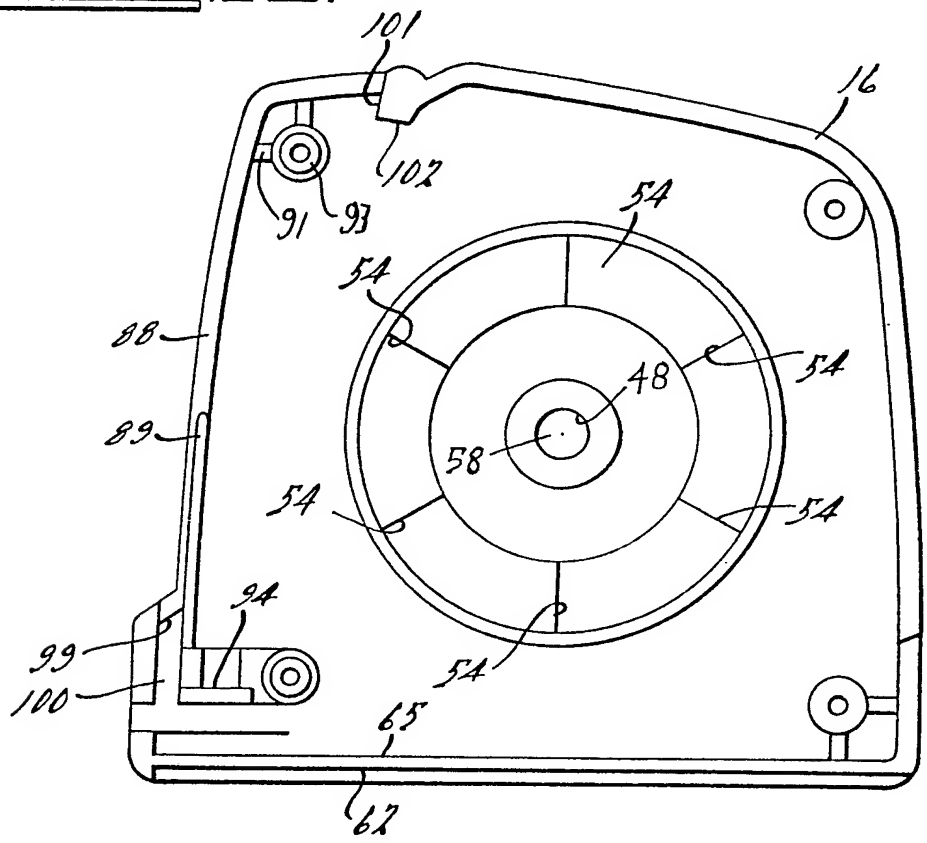


FIG. 12.



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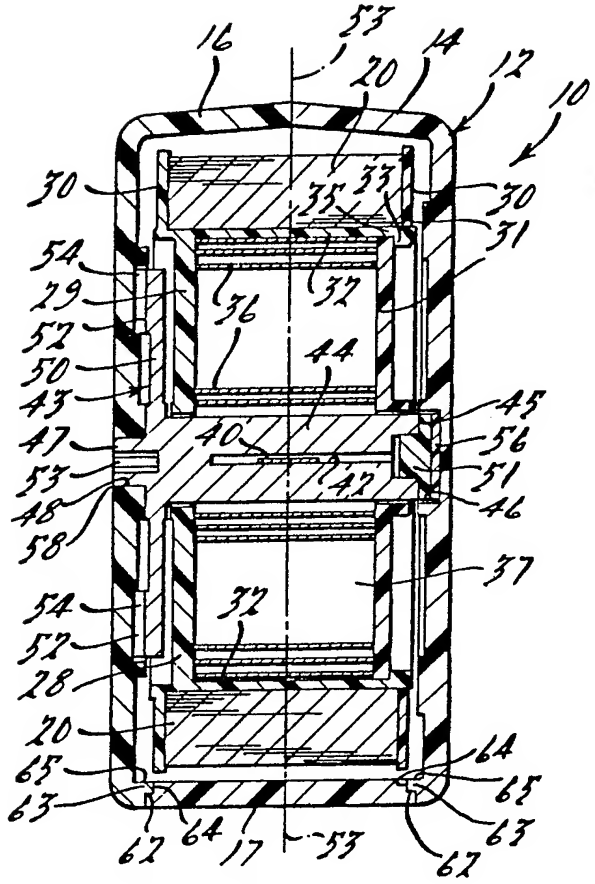

Fig. 5.

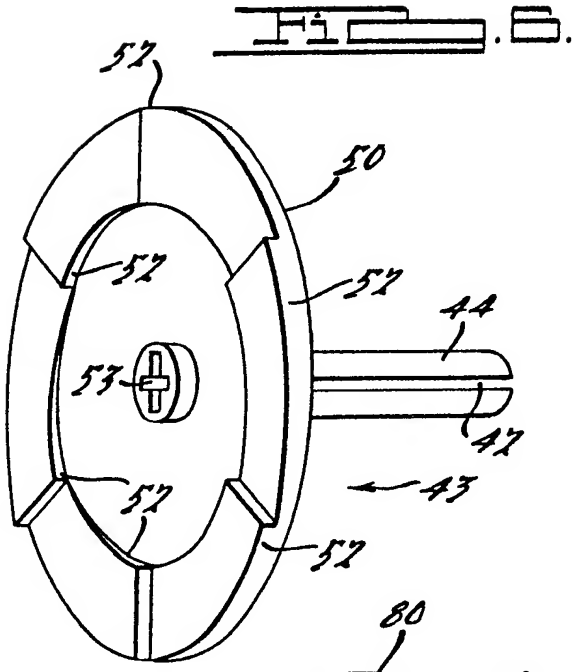

Fig. 6.

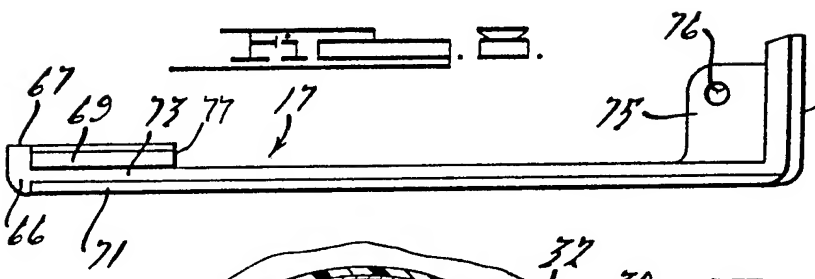

Fig. 8.

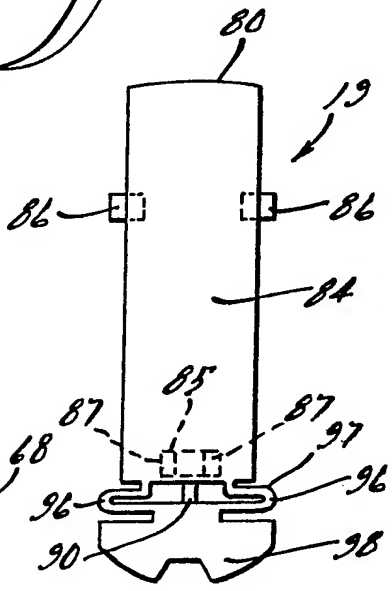

Fig. 7.

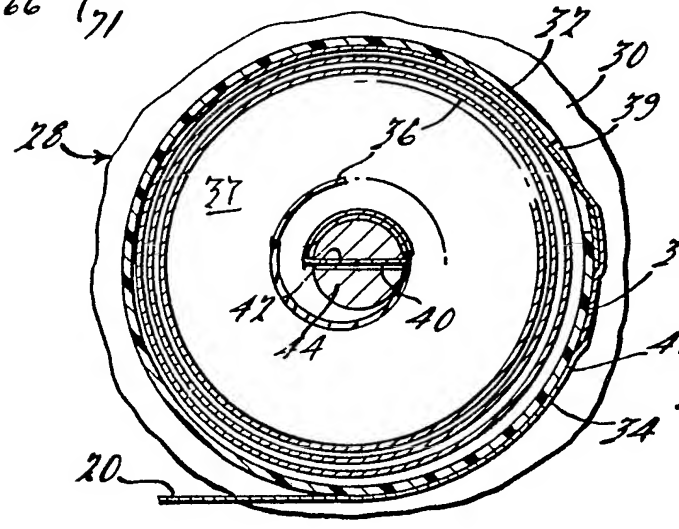

Fig. 10.

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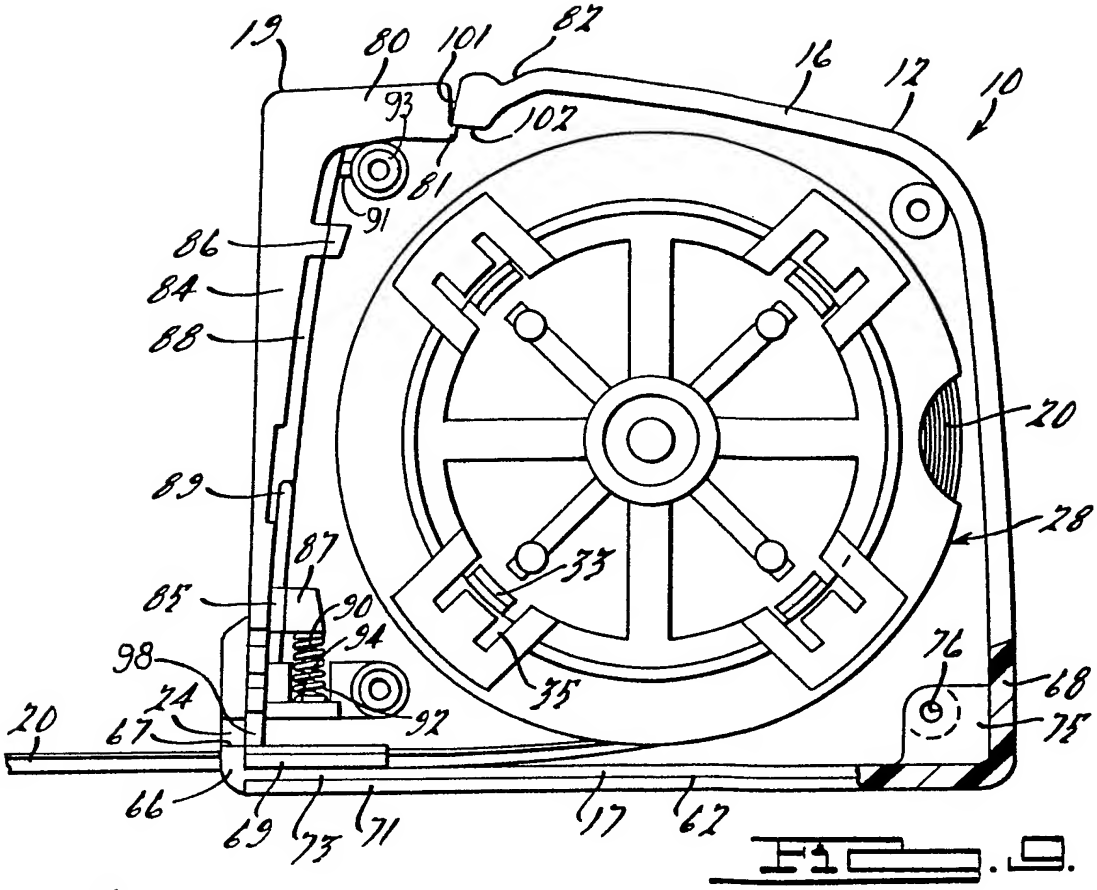
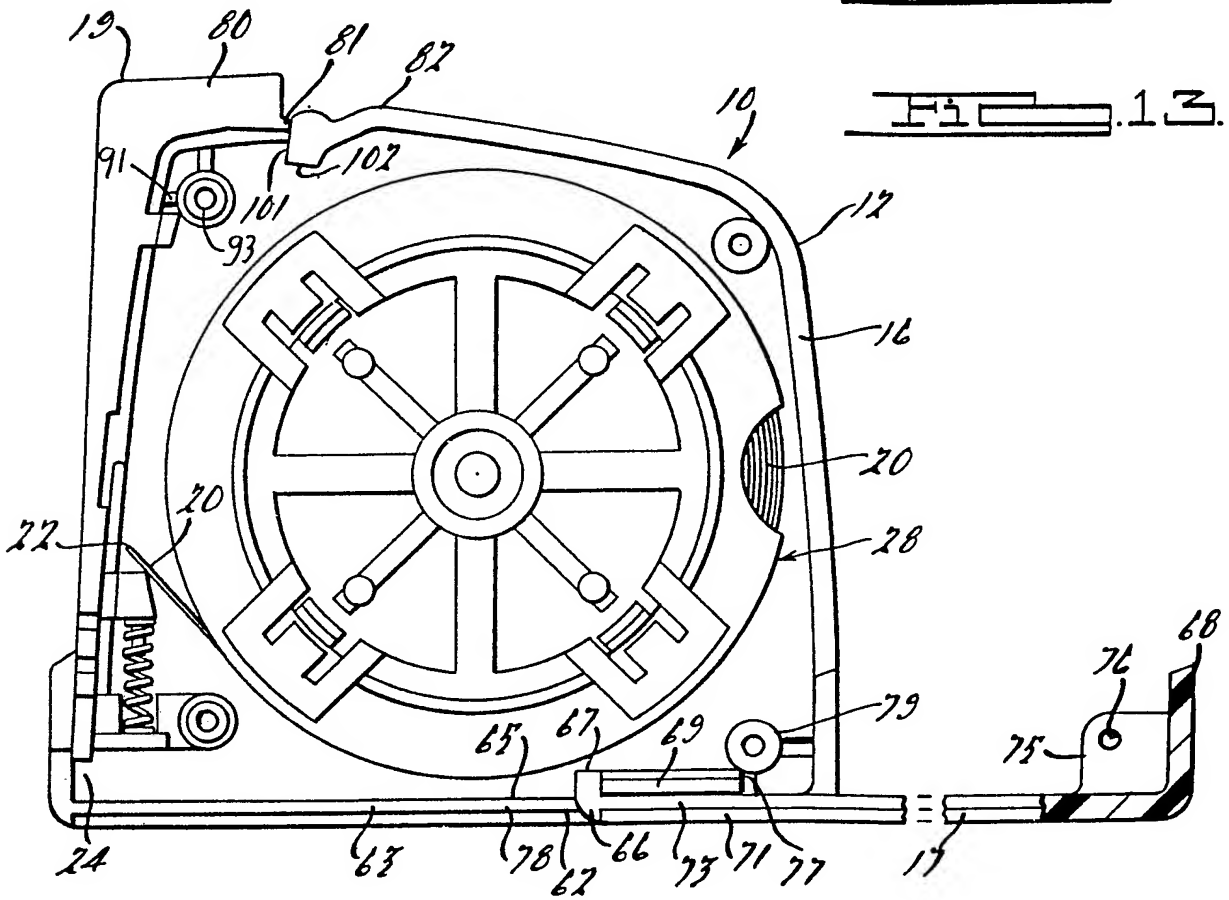


Fig. 9.

Fig. 13.



SPECIFICATION

A reparable tape measure

Technical field

This invention generally relates to tape measures and more particularly, to a reparable tape measure with an adjustable spring tension.

Background disclosure information

One very popular type of tape measure has a spool which is spring loaded within a housing. A coilable tape is coiled about the spool and extends through a slot to the outside of the housing. The end of the tape has a tab member which allows it to be hooked onto the object to be measured and retains the outer end of the tape at the slot for easy grasping of the tape.

When the tab member breaks off, the spool is then free to rotate in a direction that unwinds the spring and retracts the outer end of the tape into the housing. Once the outer end is retracted, the tape cannot be retrieved without taking the housing apart. If the housing is taken apart, the spool is displaced from its rotatably mounted position and the tape under its own spring force often uncontrollably uncoils from the spool. Because of the great difficulties in replacing a tape in the present housing and spool assemblies, one commonly throws out the tape measure when the tape breaks and buys a new one, even though the spool and housing are in perfect condition.

Attempts have been made to market a cartridge which includes a spring, spool, and tape to replace the old cartridge within the old housing. See U.S. patents 3,716,201 issued to West on February 13, 1973, and U.S. patent 3,689,004 issued to Brown and Stoutenberg on September 5, 1972. However, the housing must still be taken apart and the old spool dismounted to replace it with the new cartridges. Secondly, the cost of the cartridge is comparable with buying a new tape measure. Consequently, consumers would rather spend a little extra money and obtain a new, shiny, undented housing without having any aggravation with an uncontrolled uncoiling tape.

Furthermore, attempts have been made to adjust the spring load after the cartridge has been inserted within the housing.

What is needed is a tape measure assembly that provides access to the spool without the need to dismount the spool from within the housing in order to replace the broken tape with a new tape. In addition, what is needed is a tape measure with an improved adjustment mechanism for adjusting the tension of the spring within the cartridge.

Summary of the invention

According to the invention, a tape measure assembly includes a housing having a tape receiving slot therein. A spool is rotatably mounted within the housing. A spring is connected to the spool for biasing the spool to rotate in one direction. A tape has an inner end connected to the spool and is coiled about the spool with an outer end passing through the tape receiving slot to the exterior of the housing. A hook or other retainer is connected to the outer end of the tape to retain the outer end of the tape outside of the housing. In addition, an adjusting mechanism can be manually operated to adjust the load of the spring. Furthermore, the housing has an access port for obtaining access to the interior of the housing and to the spool without displacement or removal of the spool from its rotatably mounted position.

In one embodiment, the access port is provided with a door in the housing that is moveable between an open and closed position. Preferably, the door is slidable along the bottom of the housing and closes off the access port except for a small section which forms the tape receiving slot. The port preferably lies in a plane that is parallel to the axis of rotation of the spool.

One aspect of the invention relates to an adjusting mechanism for a tape measure. The adjusting mechanism includes a center axle rotatably mounted to the housing. The spool in turn is rotatably mounted about the axle. The center axle is rigidly connected to a ratchet plate that has at least one ratchet tooth thereon. The interior of the housing includes at least one complementary ratchet tooth that engages the plate so that the center axle and ratchet plate are free to rotate in one direction to increase the load of the spring and the center axle and ratchet plate are normally prevented from rotating in an opposite direction which unloads the spring.

Preferably, the complementary ratchet teeth are integrally formed with a side wall of the housing and axially face the center plane of the housing that is transverse to the axis of rotation of the spool. The ratchet plate teeth outwardly face and engage the ratchet teeth of the housing.

In one embodiment, the ratchet plate is biased axially outward to engage the teeth on the interior wall of the housing. The plate is axially movable against the bias so that it can disengage from the ratchet teeth of the housing whereby the plate is free to rotate to decrease the load exerted by the spring.

In this fashion, the spring tension can be adjusted after the housing has been assembled and closed about the spool. In addition, if the tape breaks and the spool rotates freely thereby retracting the broken outer end of the tape into the interior of the housing, the access door can be opened to allow the tape then to be retrieved and pulled out to allow subsequent replacement with a new tape. Furthermore, the adjusting mechanism can be operated to correctly tension the spring for the new tape. The access door and adjusting mechanism allow for replacement of only the parts that need replacing, namely the broken tape, in a convenient and easy manner.

Brief description of the drawings

Reference now will be made to the accompanying drawings in which:

Figure 1 is a top left perspective view of a tape according to the invention;

Figure 2 is a top right perspective view of the tape measure shown in Figure 1;

Figure 3 is a lower and rear perspective view of the tape measure;

Figure 4 is side elevational and partially segmented view of the tape measure with the first housing member removed;

Figure 5 is a cross-sectional view taken along the lines V-V in Figure 4;

Figure 6 is a perspective view of the center axle and ratchet plate member;

Figure 7 is a front elevational view of the lock button;

Figure 8 is a side elevational view of the access door shown in Figure 3;

Figure 9 is a side elevational view similar to Figure 4 showing the lock button in the lock position;

Figure 10 is a side elevational and fragmentary view showing the spool and the connections of the spring with the axle and the inner end of the tape;

Figure 11 is a fragmentary view of the connection of the tape to the spring taken along line XI-XI shown in Figure 10;

Figure 12 is a side elevational view of the interior of the second housing member; and

Figure 13 is a side elevational segmented view similar to Figure 4 showing a tape with a broken end retracted into the casing and with the access door in the open position.

Detailed description of the preferred embodiment

Referring now to Figures 1, 2 and 3, a tape measure 10 has a housing 12 comprising a first member 14 and second member 16 which are secured together by screws 18 a, b, c, and d. A sliding access door 17 is slidably mounted at the bottom of housing 12 and a lock button 19 is operably mounted at the front of housing 12. A metal tape 20 has its outer end 22 extending through slot 24 through the housing 12. The outer end 22 has a retaining hook 26 which can be used to hook onto objects to be measured and also retains the outer end 22 to the exterior of slot 24.

Referring now to Figures 4, 5, and 10, the tape 20 is coiled about a spool 28. The spool 28 has guide flanges 30 which guide and axially retain the tape 20. The spool 28 has a main body 29 and cover 31 snap fitted together by prongs 33 of body 29 extending through slots 35 in cover 31. The main body 29 has a cylindrical wall 32. A chamber 37 formed by cylindrical wall 32 contains a coil spring 36. The spring 36 has its outer tab end 38 passing through a slot 39 in cylindrical wall 32. As clearly shown in Figure 11, the outer tab end 38 has a hole 35 and passes through aperture 41 at inner end 34 of tape 20.

The inner end 40 of spring 36 passes through a slot 42 in an axle 44 of an adjustment member 43. The spool 28 is rotatably mounted about the axle 44. The axle 44 in turn, has each end 45 and 47 rotatably mounted in two recessed journals 46 and 48 in housing members 14 and 16. The end 45 has a plastic end cap 51. Alternatively, the end 45 can be flat and not have end cap 51. The end 47 has a non-circular countersunk hole 53 that can receive an instrument, such as a screwdriver or Allen wrench.

The adjustment member 43 as shown in Figures 5 and 6, includes the axle 44 and an integrally formed radially extending plate 50 that has on its planar surface a plurality of ratchet teeth 52. The ratchet teeth as shown in Figure 5 axially faces outwardly from the central plane 53 of the tape measure that is transverse to the axis of rotation of the axle 44 and spool 28.

The ratchet teeth 52 engage ratchet teeth 54, as shown in Figures 5 and 12, formed integrally with the second member 16. The ratchet teeth 54 face axially inwardly toward the central plane 53. The teeth 52 and 54 engage each other such that they allow only counter-clockwise rotation of the adjustment member 43 as shown in Figures 4 or 12 (clockwise as viewed in Figures 2 and 3).

Furthermore, an elastomeric pad 56 made from rubber or preferably polyurethane is positioned within recess 46 to provide a resilient bias of the adjusting member 43 such that the ratchet plate 50 is biased against the ratchet teeth 54 in housing member 16. Alternatively, the housing itself may have some resilience which would eliminate the need for pad 56. Housing member 16 has journal 48 extend therethrough to form aperture 58 which provides access to hole 53 at end 47 from the exterior of housing 12. In addition to rotating the adjusting member 43 in the clockwise direction as viewed in Figure 2 that loads the spring 36, the tool can be pressed when in the hole 53 to depress the member 43 against the bias of pad 56 or against the resilience of the housing to disengage ratchet teeth 52 from ratchet teeth 54 to allow the adjusting member 43 to move in a counter-clockwise direction as viewed in Figures 2 and 3 to unload spring 36.

Each housing member 14 and 16 has a horizontal flange 64 at its bottom edge with lower and upper facing shoulders 62 and 65 which provides a track 63 for the access door 17. The access door extends the full length of the bottom of housing 12. The door, as clearly shown in Figure 8, has a front end 66 that forms a contoured bottom edge 67 of slot 24 and an abuttment for the retaining hook 26 of tape 20. The front end 66 also has a flange 69 above edge 71 to form channel 73 which slidably receives track 67 of housing 12. The back upwardly curved end section 68 has an apertured section 75 with aperture 76 which receives screw 18d as shown in Figure 1. The screw 18d can be removed and the door slid toward the rear to increase the size of slot 24 to form access port 78 as shown in Figure 13. Th edge 77 of front section 66 abuts post 79 that receives screw 18d to provide a stop for door 17.

Referring now to Figures 4, 7 and 9, the lock button 19 has a thumb operating section 80 which is at the top 82 of the housing within easy reach of the thumb when a hand holds the housing 12 in a normal fashion. A locking shoulder 81 extends rearwardly from section 80. The button 19 has front downwardly extending section 84 which provides a front wall of housing 12. The section 84 has two retaining flanges 86 which engage an interior flange 88 of housing 12 to retain the button 19 in position. In addition, section 84 has third extension 85 that has opposing retaining flanges 87 which engage interior flanges 89 of housing 12. The extention 85 also forms a spring seat 90 which holds coil spring 92 in place. Spring 92

has its lower end abutting a spring seat 94 on housing member 16. The button 17 has integral compression regulating straps 96 and a contoured tape engaging section 98.

In operation, the button 19 is normally biased by spring 92 upwardly to a release position. Shoulder 81 abuts the forwardly inclined edge 101 of housing 12. Upon depression of the top thumb section 80, the tape engaging section 98 moves downwardly to frictionally engage and clamp the tape 20 between it and the countoured surface 67 of access door 68. The downward vertical force exerted by the thumb causes shoulder 81 of thumb section 80 to engage shoulder 102 in the upper portion of housing 12. Friction between shoulders 81 and 102 maintains button 19 in the locked position. The straps 96 regulate the force exerted by tape engaging section 98 to prevent any excessive and permanently deforming force from being exerted onto the tape 20. A forward motion exerted on the thumb section 80 disengages the shoulders 81 and 102 and allows the spring 92 to release the button 19. Flanges 86 can abut web 91 of post 93 to provide an upper stop for button 19. The outer ends 97 of straps 96 are prevented from exiting channel 100 by shoulders 99 as viewed in Figure 12.

Referring to Figure 13, if the retaining hook 26 becomes disengaged from the tape 20 or the outer end 22 breaks in another fashion, the tape 20 recedes into the interior of the housing and allows the spool 28 to rotate (counterclockwise as shown in Figure 13) to unload the spring 36. The tape cannot be easily retrieved until access to the interior is easily achieved. In this fashion, the lower right hand screw 18d can be removed and the access door 17 slid to the open position to increase the size of slot 24 to form access port 18 as described before. At this point, the tape end 22 can be easily grabbed and pulled back out from the housing interior. The access door is then reclosed and resecured with screw 18d while the tape end 22 is held. The tape is now pulled to totally unwind the tape 20 from spool 28 until the inner end 34 can be grabbed and disengaged from the tab end 38 of spring 36. The tab end 38 is maintained in position by insertion of a nail or similar object placed in hole 35. A new tape can have its inner end reattached to the tabe end 38. At this point, a rewind tool can engage aperture 58 to crank the adjustment member 43 in a clockwise direction as shown in Figure 3 until the spring is fully wound. A new tape 20 is then attached to tab end 38 and the nail is removed from hole 35. The new tape 20 is then free to rewind onto spool 28. The tape measure is then free to be used in its normal fashion.

In this fasion, reparable tape measure has an access port which allows easy access to the tape. More particularly, the slot 24 can be enlarged upon the sliding of the access door. Furthermore, the tape can be replaced without removal of the tape spool from its rotatably mounted position. In addition, an adjustment mechanism allows the spring to be correctly retensioned for the replacement tape. The lock button 19 is positioned to provide for comfortable and easy use in locking and releasing the tape.

Variations and modifications of the present invention are possible without departing from its scope and spirit as defined by the appended claims.

CLAIMS

1. A tape measure assembly characterized by:
a housing having a tape receiving slot therein;
a tape receiving spool;
means for rotatably mounting said spool within said housing;
spring means for rotatably biasing said spool in one direction;
a tape adapted to be removably coiled about said spool and having an outer end extending through said slot;
means for removably connecting an inner end of the tape to said spool;
retaining means retaining said outer end of said tape outside of said housing;
an adjusting means for adjusting the load of said spring means;
an enlarged access means for forming an access port larger than the normal size of said slot for obtaining access to the interior of said housing without the displacement or removal of said spool from its rotatably mounted position.

2. A tape measure as defined in claim 1 further characterized by:
said adjusting means being operable from the exterior of said housing with said housing remaining closed and said access means remaining closed.

3. A tape measure as defined in claim 1 further characterized by:
said access means comprising a door moveable between an open and closed position with respect to the access port.

4. A tape measure as defined in claim 3 further characterized by
said door forming a side of said housing being parallel to the axis of rotation of said spool such that the plane of the access port is parallel to the axis of rotation of said spool and aligned with the longitudinal center plane of said tape that is perpendicular to said axis of rotation.

5. A tape measure as defined in claim 4 further characterized by:
said access door forming the bottom of said tape measure with its front edge forming a seat means for an outer tab end of said tape.

6. A tape measure as defined in claim 5 further characterized by:
said access door being slidably mounted on said casing toward the rear side to provide access to said interior of said housing.

7. A tape measure as defined in claim 1 further characterized by:
said adjusting means being operable from the exterior of said housing.

8. A tape measure as defined in claim 1 further characterized by:
said adjusting means being operable to increase the biasing load of said spring; and
preventing means for normally preventing said adjuster means for decreasing said spring load.

9. A tape measure as defined in claim 8 further

characterized by:

an overriding means for overriding said preventing means and allowing said adjusting means to decrease the load of said spring means.

10. A tape measure as defined in claim 1 further characterized by:

said adjusting means includes a center axle about which said spool is rotatable;

said center axle being rigidly connected to a ratchet plate having at least one ratchet thereon;

said interior of said housing including a complementary ratchet so that said center axle and ratchet plate are free to rotate in one direction to increase the load of said spring means and normally preventing said center axle and ratchet plate to rotate in a direction which unloads said spring means.

10. A tape measure characterized by:

a housing having a tape receiving slot therein;

a tape receiving spool;

means for rotatably mounting the spool within said housing;

a tape adapted to be removably coiled about said spool and having its outer end extending through said slot;

means for removably connecting an inner end of said tape to said spool;

spring means for biasing said spool to rotate in a direction so that said tape is pulled into said housing and is coiled about said spool; and

an adjusting means for adjusting the biasing load of said spring means, said adjusting means includes

ratchet teeth fixed on an interior wall of said housing and facing axially toward the center plane of said housing that is transverse to the axis of rotation of said spool;

a ratchet plate connected to said spring means and having complementary teeth facing axially outward away from said center plane and engaging the ratchet teeth of said housing; and

said ratchet teeth having engaging surfaces that allow said ratchet plate to be rotated in a direction to increase the biasing load of said spring means and normally preventing said ratchet plate from rotating in a direction to decrease the load of said spring means.

11. A tape measure as defined in claim 10 further characterized by:

a biasing means biasing said ratchet teeth and said complementary ratchet teeth into engagement;

said ratachet plate being axially moveable against said biasing means to a disengage position whereby said ratchet plate is free to rotate to decrease the load of said spring means.

12. A tape measure as defined in claim 11 further characterized by:

said ratchet plate being operable from the exterior of said housing with said housing remaining closed.

13. A tape measure characterized by:

a housing having a tape receiving slot therein;

a tape receiving spool;

means for rotatably mounting said spool within said housing;

a tape removably coiled about said spool and having its outer and extending through said slot;

spring means for biasing said spool to rotate in a direction so that said tape is pulled into said housing and is coiled about said spool;

an adjusting means for adjusting the biasing load of said spring means;

preventing means normally preventing said adjuster from decreasing said biasing load of said spring means; and

overriding means for overriding said preventing means and allowing said adjuster means to decrease the load of said spring means.

14. A tape measure substantially as hereinbefore described with reference to and as shown in the accompanying drawings.

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